3.10 Invasive Plants

Introduction

The introduction of non-native, invasive plant species (invasive plants) continues to reduce the ecological integrity and economic productivity of natural systems and agriculture on a worldwide basis. Invasive plant species create more than $35 billion in economic losses and treatment costs annually in the United States (Pimental, et al. 2005). Invasive plants, also called noxious weeds, have disrupted natural processes on nearly 100 million acres in the United States and are spreading at an estimated rate of 14 percent annually (USDA Animal and Plant Health Inspection Service 2003).

Invasive plants are non-native, aggressive plants brought to North America either accidentally or intentionally. These species out-compete the native species for water, nutrients, and light which in turn crowds out and reduces populations of native plants, and of particular concern, rare plants. Invasive plants degrade recreation areas, increase fire risk, reduce forest health, decrease wildlife habitat quality, invade croplands and pastures, and decrease of livestock forage availability. Certain invasive plants are potentially toxic to humans and animals. Invasive plant seeds can remain viable for many years and the plants have extensive root systems which can re-sprout even after the tops of plants have been removed. Seed viability and extensive root systems make early detection of invasive plants critical to eradicate them and control their spread. Early detection of invasive plants and rapid treatment response increases the chance that populations can be eradicated and will not become established. Invasive plants have no natural predators at the infestation site since they are removed from their native habitats and natural biological control agents. The lack of biological control agents gives invasive plants a competitive edge over native plants and makes it very difficult to control the invasive plants. Invasive plants are primarily found in disturbed areas, often along roads and trails. Invasive plants were essentially nonexistent before the arrival of European settlers. Native vegetation and habitats would have been more intact in the Bitterroot Valley.

Bromus tectorum (cheatgrass), *Centaurea stoebe ssp. macranthos* (spotted knapweed), *Cirsium arvense* (Canada thistle), *Euphorbia esula* (leafy spurge), *Hypericum perfoliatm* (St. John's wort), *Leucanthemum vulgare* (oxeye daisy), *Potentilla recta* (sulfur cinquefoil), and *Ranunculus acris* (tall buttercup) are all found within the project area. These eight invasive plants are of particular concern on the Bitterroot National Forest and treating invasive plant populations is a Forest priority. Some of the invasive plant populations are currently small and eradication from the project area is possible. Invasive plant species with rhizomatous root systems can be extremely difficult to eradicate.

Roads, and some areas around the campground in the project area, are regularly treated with herbicides as approved in the Noxious Weed Treatment Project Record of Decision (USDA Forest Service 2003a).

Summary of Effects

All action alternatives propose treatments that will include soil displacement. Landings and temporary roads create the most severe soil displacement and pose the largest threat for invasive plants establishment. Alternative 2 proposes 29.88 acres of soil displacement from temporary roads and landings, Alternative 3 proposes 19 acres of soil displacement

from landings and none from temporary roads, and Alternative 4 proposes 18.65 acres of soil displacement from temporary roads and landings (Table 3.10- 1). Therefore, Alternative 3 would have the least impact on severe soil disturbance due to having no temporary roads created that would potentially distribute invasive plants through the area. Alternative 2 proposes the highest area in soil displacement with the potential of greater risk of creating new invasive plants populations and invasive plants spread by having more disturbance in both overall acres and temporary roads.

Table 3.10- 1: Summary of Soil Disturbances between Alternatives

ALTERNATIVES	SOIL DISTURBANCE FROM LANDINGS (ACRES)	SOIL DISTURBANCE FROM TEMPORARY ROADS (ACRES)	OVERALL SOIL DISTURBANCE FROM PROPOSED TREATMENT (ACRES)
Alternative 1	0	0	0
Alternative 2	27	2.88	132
Alternative 3	19	0	116
Alternative 4	17	1.65	113

3.10.1 Overview of Relevant Laws, Regulations, and Policies

Direction and authority for invasive plant management is provided in the National Forest Management Act (PL94-588), Federal Land Policy and Management Act (PL 94-579), Carlson-Foley Act (PL-583), Federal Noxious Weed Control Act (PL-629), and the Montana Weed Management Plan (2001).

3.10.1.1 National Forest Management Act of 1976

The National Forest Management Act of 1976 as amended directs the FS to provide for diversity of plant and animal communities and requires the development and implementation of a resource management plan for a National Forest. This Act applies to the Como Forest Health project by setting the stage for the inclusion of provisions for the protection of plant diversity in site-specific projects.

3.10.1.2 Bitterroot National Forest Plan (USDA FS 1987)

The Bitterroot National Forest Plan (1987) guides natural resource management activities and established a goal for Forest-wide management of noxious weeds that directs the Forest to "control noxious weeds to protect resource values and minimize adverse effects on adjacent private lands". The Forest Plan applies directly to the Como FHP by requiring design criteria that will accomplish noxious weed control.

Consistency with the Bitterroot National Forest Plan

Goals and objectives on the Bitterroot National Forest Plan (Forest Plan, FP) states that noxious weeds (invasive plants) will be controlled to protect resource values (FP p. II-3 & II-29).

3.10.1.3 Federal Noxious Weed Act of 1974 as amended in 1990

Under the 1990 amendment to the Federal Noxious Weed Act, federal agencies are directed to enter into agreements with appropriate state and local agencies to coordinate the management of noxious weeds. Specifically, the Act calls for federal agencies to: a) develop and coordinate a program to control such plants on the agency's land; b) complete and implement cooperative agreements with the States regarding undesirable

plants on agency land; and c) establish integrated management systems to control or contain undesirable plants targeted under the cooperative agreements.

3.10.1.4 The Bitterroot National Forest Noxious Weed Treatment Project Environmental Impact Statement and Record of Decision, March 2003

The Bitterroot National Forest Noxious Weed Treatment Project Environmental Impact Statement and Record of Decision (March 2003) implemented Forest Plan direction and authorized the treatment of invasive plants on areas of the Bitterroot National Forest. The EIS/ROD includes the area encompassed by the Como FHP and the associated road system in the portions of the Bitterroot Forest that were analyzed, approved and prescribed for noxious weed/invasive plant prevention, control and treatment

3.10.1.5 The Montana Noxious Weed Act

The Montana Noxious Weed Control Act defines a noxious weed as "any exotic plant species established or potentially could be established in the State which may render land unfit for agriculture, forestry, livestock, wildlife, or other beneficial uses, and is further designated as either a state-wide or county-wide noxious weed" (MCA 7-22-2101).

3.10.1.5 Executive Order 13112 (1999)

Executive Order 13112 (1999) directs all federal agencies to conduct activities that reduce invasive plant populations and provide for their control. The EO applies directly to the Como FHP by providing additional agency justification for design criteria or actions associated with the project that result in the reduction and control of invasive plants in the project area.

3.10.1.6 US Forest Service Manual 2080

US Forest Service Manual (FSM) 2080, Supplement R1-2000-2001-1, implements an Integrated Weed Management approach for management of noxious weeds on National Forests in Region 1. Manual direction requires specific practices for invasive plant management during ground disturbing activities, including activities associated with timber harvest.

FSM 2080 defines noxious weeds as "those plant species designated as noxious by the Secretary of Agriculture or by the responsible State official. "

3.10.1.7 Forest Service Manual (FSM) 2900

Forest Service Manual (FSM) 2900 establishes code and a new manual for Invasive Species Management. FSM 2900 sets forth National Forest policy, responsibilities, and direction for the prevention, detection, control, and restoration of effects from aquatic and terrestrial invasive species (including vertebrates, invertebrates, plants, and pathogens).

The FSM 2900 applies directly to the effects analysis and design criteria of the Como Forest Health Project. The manual directs that management activities:

1) will employ actions that will help contain, reduce, or remove infestations of invasive species
2) where necessary, will implement restoration, rehabilitation, and/or revegetation activities to prevent or reduce the likelihood of the establishment or spread of invasive species.

3.10.1.8 National Strategic Framework for Invasive Species Management (August 2013)

The US Forest Service developed a National Strategic Framework for Invasive Species Management (August 2013) to assist in protection of our Nation's terrestrial and aquatic ecosystems. This Framework supersedes the agency's 2004 Invasive Species Strategy and Implementation Plan and provides a guide for Forest Service invasive species management activities.

3.10.2 Existing Condition of the Affected Environment

Noxious weeds have been slowly encroaching into open areas throughout the Como Forest Health project area, particularly along roadsides and other disturbed areas. Most of the invasive plant infestations within the project area occur in old roadbeds, active road corridors on the unit edges, and within unit boundaries away from roads on south facing slopes. Due to the impact of invasive plant colonization is more likely to occur in native grasslands and meadows where invasive plants easily out-compete native species, these similar areas within the project area are more vulnerable to colonization and population spread.

The project area was surveyed for invasive plants during the 2003 and 2010-2013 field seasons. Surveys documented eight species of invasive plants in the project area (Table 3.10- 2).

3.10.2.1 General Descriptions and Control Methods for Invasive Plants

Cheatgrass (Bromus tectorum)

Cheatgrass is known to occur in scattered or patchy distribution on many open grasslands and roadsides. This plant can alter the ecosystem process and change structure and function of plant communities. The ability of this plant to dry completely, accumulate litter, and its structure make it extremely flammable. Cheatgrass invasion has increased the frequency of fires from once every 60 to 110 years to once every 3 to 5 years on millions of acres of rangeland in the Great Basin (Whisenant 1990). The threat of invasion of many open grasslands and areas on the Forest is potentially high, given the amount of fire experienced during the summer of 2000. This species is spread by seed. Cheatgrass typically dries out and disperses seed by mid-June (Table 3.10- 4).

Table 3.10- 2: Invasive Plants Found in the Como Forest Health Project Area.

SCIENTIFIC NAME	COMMON NAME	LISTING STATUS
Ranunculus acris	Tall Buttercup	Priority 2A
Centaurea stoebe	Spotted Knapweed	Priority 2B
Cirsium arvense	Canada Thistle	Priority 2B
Euphorbia esula	Leafy Spurge	Priority 2B
Hypericum perfoliatum	St. Johnswort	Priority 2B
Leucanthemum vulgare	Oxeye Daisy	Priority 2B
Potentilla recta	Sulfur Cinquefoil	Priority 2B
Bromus tectorum	Cheatgrass	Priority 3

Table 3.10- 3: Species are Listed Using the Guidelines from the State of Montana.

Priority 1A	These weeds are not present in Montana. Management criteria will require eradication if detected; education; and prevention
Priority 1B	These weeds have limited presence in Montana. Management criteria will require eradication or containment and education.
Priority 2A	These weeds are common in isolated areas of Montana. Management criteria will require eradication or containment where less abundant. Management shall be prioritized by local weed districts.
Priority 2B	These weeds are abundant in Montana and widespread in many counties. Management criteria will require eradication or containment where less abundant. Management shall be prioritized by local weed districts.
Priority 3	Regulated plants (Not Montana listed noxious weeds): These regulated plants have the potential to have significant negative impacts. The plant may not be intentionally spread or sold other than as a contaminant in agricultural products. The state recommends research, education, and prevention to minimize the spread of the regulated plant.

Spotted Knapweed (Centaurea biebersteinii {C. maculosa})

The Bitterroot National Forest is currently infested with about 274,000 acres of spotted knapweed (USDA Forest Service 2004). It generally occurs below 6,500 feet on the Bitterroot National Forest, except on extreme southern aspects. There is a strong correlation between canopy closure and knapweed coverage; with more sunlight, there is an increased likelihood of infestation. Knapweed infestation is also correlated with aspect, soil type and the degree of soil disturbance. It is most commonly found on dry, sterile, gravelly, or sandy soils in pastures, and will quickly invade disturbed sites such as road and railroad rights-of-way, waste places, abandoned fields, timber harvest units and overgrazed rangeland. It is not common on cultivated land or on irrigated pasture. Spotted knapweed is not usually found in shaded areas. Ponderosa pine and/or Douglas-fir bunchgrass types, dry shrub communities and scree types are the most susceptible to knapweed invasion (Losensky 1987).

Current treatments for spotted knapweed include mechanical (hand pulling and mowing), biological and chemical. Hand pulling has proven to be up to 35% effective, costs up to $8,498 per acre and can only be accomplished for small areas (USDA Forest Service 2003a). Mowing has been done at recreation sites to make outdoor activities more accessible, although it does not reduce the number of plants. Several biological agents specific to spotted knapweed have been released throughout the Bitterroot National Forest.

The Forest has been releasing biological control agents for 20 years. Biological controls are long-term solutions and no decrease in knapweed populations is expected until the insect populations increase. Biological control agents should decrease knapweed seed production by up to 80% once they become well established. In the meantime, chemical control methods (especially Picloram) appear to be the most successful treatment of smaller knapweed infestations and containing existing populations (USDA Forest Service 1996a).

Canada Thistle (Cirsium arvense)

Sites susceptible for invasion include disturbed areas, roadsides, and riparian areas. Canada thistle has been known in Ravalli County since 1975. The Bitterroot forest is infested with about 25 acres. Canada thistle reproduces both by seed and by lateral roots; however most of its reproductive energy is put into vegetative propagation (USDA FS 2002). It has an extensive lateral root system that is not easily eradicated once it becomes established, but Forest approved herbicides can be effective.

Leafy spurge (Euphorbia esula)

Leafy spurge is native to eastern and central Europe, extending into Western Europe and temperate areas in Asia. It was brought to northeastern North America as an ornamental in 1829 and spread rapidly. Leafy spurge seeds have a high germination rate and may remain viable in the soil for at least seven years. Leafy spurge can produce up to 140 seeds starting after its second year (Gucker, Corey L. 2010). Seeds are forcibly ejected up to 15 feet (4.5 m) from mature, dry leafy spurge capsules (Selleck, G. W. 1958). Of the seed bank studies available, very few reported leafy spurge germination after more than 5 years in the soil. During field and laboratory studies conducted at the University of Saskatchewan, Selleck found that some leafy spurge seeds germinated after 5 years in soil, but 99% of germination occurred in the first 2 years of burial. Seeds stored in metal containers at room temperature were still viable after 13 years (Gucker, Corey L. 2010).

Soil disturbances and low vegetation cover are associated with increased leafy spurge seedling establishment, growth, and survival. Vertical seedling root growth is more extensive, and production of root buds is earlier in areas with low vegetation cover or no associated vegetation than in areas with high cover (Gucker, Corey L. 2010).

Leafy spurge has a very large, highly regenerative root that can extend to 32 feet deep. This deep tap root and ability of leafy spurge to regenerate from small pieces of root, makes it very difficult to eradicate. Leafy spurge is "extremely difficult to control with herbicides" and "almost impossible to control by cultural or physical methods"(Hansen et al. 2004). Many sources indicate that prioritizing control is important to successful management. Weed control handbooks and management guides report that early detection of new and small leafy spurge populations should be a top control priority, because well-established populations are rarely controlled by any contemporary methods (Hansen et al. 2004).

Immediate treatment with herbicides on very small populations can be effective. Biological controls, alone or in combination with herbicides, are probably the most effective methods of managing larger populations of leafy spurge. Mechanical or hand-pulling methods only contribute to the vegetative spread of leafy spurge. Older plants are able to survive fire because their regenerative root system sprouts after fire (low-high fire severity). Post-fire sprouting is common for mature leafy spurge, and leafy spurge abundance can be greater on burned than unburned sites. Fire's effect on leafy spurge seeds and seedlings is more variable. Reduced leafy spurge seed germination was reported after a spring fire in western North Dakota's Little Missouri National Grassland (Hull-Sieg, C. 1994). On two sites in east-central North Dakota, however, leafy spurge seedling density was high following spring prescribed fires. Survival beyond the seedling stage was not reported, but researchers suggested that fire could be useful in seed bank depletion (Gucker, Corey L. 2010).

Leafy spurge infested about 100 acres of the Bitterroot National Forest before the fires in 2000. An active integrated management program using herbicides and biological agents is successfully reducing spread and controlling new satellite infestations. Because leafy spurge spreads rapidly and is difficult to manage, it is a high priority invasive plant on the Bitterroot National Forest (Table 3.10- 4).

St. John's Wort (Hypericum perfoliatum)

Approximately 750 acres of the Bitterroot National Forest were infested with St. John's wort prior to the 2000 fires (USDA FS 1995b). Populations are scattered throughout the forest and appear to have no particular affinity to a specific vegetative cover type. It is found on rangeland areas, poorly managed pastures, fields, roadsides, forest clearings, and burned areas. This species spreads by seed and short runners. One plant can produce 15,000 to 30,000 seeds, causing a rapid spread once it is established. The seeds have a gelatinous coating, which enables them to stick to animals, clothing, or vehicles.

Biological controls have had great success in other states. The leaf-feeding beetle *Chrysolina quadrigemina* is a great species for control. It must be released with the correct moisture standards and if the population decreases dramatically it must be reintroduced. Another management method is improving the soil by scarification and fertilization and revegetating with native plants, which can reduce or eliminate St. John's wort. Mowing or grazing in not recommended, though it decreases seed spread, because it increases rhizome growth.

Oxeye Daisy (Leucanthemum vulgare)

Oxeye daisy infests more than 1,000 acres on the Forest, with most infestations occurring along roadsides and trails. Moist sites such as mountain meadows and riparian areas are most susceptible to invasion by this plant. Oxeye daisy is becoming more common throughout the Forest (USDA Forest Service 2003a). Livestock avoid grazing on this plant and it appears to affect the milk in livestock that consume it. Oxeye daisy spreads by seed and vegetative plant parts. The Bitterroot National Forest uses picloram to eradicate this invasive plant.

Sulfur Cinquefoil (Potentilla recta)

Over 2,500 acres of land on the Bitterroot National Forest are infested with sulfur cinquefoil (USDA Forest Service 1996). Sulfur cinquefoil is adapted to a wide range of environmental conditions. It has been found growing in open grasslands, open forest, and disturbed areas, and often in association with spotted knapweed. Sulfur cinquefoil will often out-compete spotted knapweed for habitat.

A containment strategy is recommended for sulfur cinquefoil, using herbicide. No other method of control appears to be as effective for this invasive plant. No biological control agents are available to control or eradicate sulfur cinquefoil.

Tall buttercup (Ranunculus acris)

Tall buttercup infests about 68 acres of the Bitterroot National Forest. Sites most susceptible to invasion include sub-irrigated and wet meadows, and riparian zones.

Table 3.10- 4: Invasive Plants in Como Forest Health Project Units.

UNIT	SPECIES	COMMENTS
1	spotted knapweed oxeye daisy St. John's wort	Access road for units 1, 3, and 6 is heavily infested with spotted knapweed. Spotted knapweed is also present on south facing slopes. Oxeye daisy is also common on the road. Small spots of St. John's wort are found on the road in unit 1.
2	No invasive plants found	
3	spotted knapweed oxeye daisy	Access road for units 1, 3,and 6 is heavily infested with spotted knapweed. Spotted knapweed is also present on south facing slopes. Oxeye daisy is also common on the road.
4	spotted knapweed oxeye daisy	Found throughout the unit.
5	No invasive plants found	
6	spotted knapweed oxeye daisy	Access road for units 1, 3, and 6 is heavily infested with spotted knapweed. Spotted knapweed is also present on south facing slopes. Oxeye daisy is also common on the road.
7	No invasive plants found	
8	No invasive plants found	
9	spotted knapweed St. John's wort Canada thistle	Trace amounts of spotted knapweed. Two dozen St. John's wort plants were found on the existing secondary road.
10	oxeye daisy	Found throughout the unit.
12	spotted knapweed	Spotted knapweed infests 1-5% in units, and 5% on the road.
13	spotted knapweed	Some spotted knapweed was found along the two-track that runs along the top of the ridge.
14	spotted knapweed cheatgrass leafy spurge St. John's wort bull thistle	Traces of both spotted knapweed and cheatgrass were found throughout the unit. 2 small patches of leafy spurge were found along a steep south slope, dry, approx. 50 plants. Cheatgrass is plentiful throughout the unit, trace amounts of spotted knapweed are throughout the unit. St. John's wort was noted in 2010.
15	cheatgrass spotted knapweed	There is 1% of spotted knapweed throughout the unit. Patches of cheatgrass were found near ridgeline.
16	bull thistle	1% of spotted knapweed was found on South aspects within the unit.
17	oxeye daisy	Found throughout the unit.
18	spotted knapweed	Most roads through the unit have 5% spotted knapweed, Some spotted knapweed was found off roads in open and disturbed areas.
19	spotted knapweed	Most roads throughout the unit have 5% spotted knapweed. Some spotted knapweed was found off roads in open and disturbed areas.

UNIT	SPECIES	COMMENTS
20	cheatgrass spotted knapweed	Spotted knapweed and cheatgrass covers 5% on south facing slopes.
21	No invasive plants found	
24	No invasive plants found	
25	No invasive plants found	
26	cheatgrass spotted knapweed	Found throughout the unit.
27	cheatgrass spotted knapweed	Found throughout the unit.
28	spotted knapweed	Trace amounts of spotted knapweed is on SE facing slopes where canopy is open. Canada thistle, and oxeye daisy are present along the ditch road used to access the unit.
32	No invasive plants found	
34	No invasive plants found	
36	St. John's wort spotted knapweed	St. John's wort was found on the Lick Creek Rd. Spotted knapweed is common throughout the unit- 1% to 5%.
38	tall buttercup Canada thistle sulfur cinquefoil oxeye daisy	Unit 38 is adjacent to a wet meadow. Tall buttercup, Canada thistle, sulfur cinquefoil, and oxeye daisy are present in the meadow; no invasive plants noted in the unit.
39	cheatgrass spotted knapweed	Spotted knapweed and cheatgrass are present in forest clearings, especially on the south facing aspect.
40	cheatgrass spotted knapweed	Found throughout the unit.
41	No invasive plants found	
42	No invasive plants found	
43	No invasive plants found	
45	spotted knapweed	Found throughout the unit.
46	spotted knapweed	Traces of spotted knapweed are on the 2-track and in areas with open canopies.
47	spotted knapweed	Traces of spotted knapweed are on the 2-track and in areas with open canopies.
48	No invasive plants found	
49	spotted knapweed	Trace amounts of spotted knapweed in disturbed sections of the unit.
50	spotted knapweed St. John's wort	Small patches of St. John's wort were found in the dispersed campsite. Spotted knapweed is common across the south 1/3 of the unit on south facing slopes.
51	spotted knapweed	A two-track used by OHVs runs up the southern boundary of unit and has spotted knapweed in it. No invasive plants were in the interior of the unit.

UNIT	SPECIES	COMMENTS
52	spotted knapweed	Found throughout the unit.
53	cheatgrass spotted knapweed	Spotted knapweed and cheatgrass are common in disturbed areas in the unit.
54	No invasive plants found	
56	No invasive plants found	
57	spotted knapweed oxeye daisy	Found throughout the unit.
58	No invasive plants found	
59	No invasive plants found	
60	No invasive plants found	
61	No invasive plants found	
62	cheatgrass spotted knapweed	Found throughout the unit.
63	No invasive plants found	
64	spotted knapweed	One to five percent of spotted knapweed was found in this unit. Five percent was found along the road.
65	spotted knapweed St. John's wort sulfur cinquefoil	St. John's wort, sulfur cinquefoil, and large amounts of spotted knapweed were found in the gravel pit and within the upper portion of the unit.

3.10.2.2 Desired Condition

The Bitterroot National Forest Plan direction on invasive plant management states:

- Control noxious weeds to protect resource values and minimize adverse effects on adjacent private land.
- Complete an evaluation of the risk of spread of noxious weeds in vegetative communities and implement control strategies.
- Develop noxious weed control strategies.

3.10.3 Environmental Consequences

3.10.3.1 Methodology

The forest botanist and biological science technicians surveyed invasive plants in the project area in 2003 and 2010-2013. General and intensive surveys were conducted in the project area. The surveys focused on plants listed on the most current Montana State invasive plants list. Invasive plant sites found within the project area were documented and mapped. Effects were analyzed by including soil disturbance and canopy cover.

Incomplete and Unavailable Information

Previous activities (timber harvest, road construction and maintenance, recreation, land development, agriculture, grazing, etc.) most likely contributed to the establishment and spread of invasive plants. Since the establishment of invasive plants is unknown and cannot be inferred from existing records, all infestations have been integrated into the existing condition.

Spatial Context and Timeframe for Effects Analysis

The spatial bounds of the invasive plants analysis are based on the project's influence on the risk of invasive plant introduction, spread, and establishment in the project area. Because ground disturbance increases these risks, the analysis area includes all treatment units and road systems associated with proposed project activities.

The analysis timeframe spans the existing condition, effects of the project during implementation, and longer-term effects after project activities cease. The existing condition of invasive plants in the Como Forest Health project area is the culmination of past activities that favored their introduction, spread, and establishment. The analysis timeframe account for the cumulative effects of all actions up to the present, and the short-term and long-term effects of project implementation.

Connected Actions, Past, Present, and Foreseeable Activities Relevant to Cumulative Effects Analysis

Past ground-disturbing activities such as timber harvest, road construction, road maintenance, trail development, and dispersed campsite development have contributed to the spread of invasive plants in the area. Recreational and economic land uses (hunting, hiking, fishing, logging, firewood gathering, off-road driving, and horseback riding) have also contributed to the spread of invasive plants, since forest users, their animals, and their vehicles can be vectors for seed spread. Wildlife movements also transport invasive plant seeds across the landscape. These activities are likely to continue.

Bitterroot National Forest data and data from other agencies, organizations, and communities in Ravalli County show that invasive plants occur throughout the county. The numbers of species, new populations, and known locations have not been fully recorded for Ravalli County, the Bitterroot National Forest, and non-Federal land in the project area. Therefore, the Forest Service can only act on the assumption that -

- there is a source of invasive plants on adjacent non-federal lands that can spread to federal lands, especially when differing land ownership can lie adjacent to each other, as within some watersheds;
- conversely, the potential of invasive plants to spread from the Bitterroot National Forest to adjacent non-federal lands on which invasive plants may not be established.

Under either assumption, the risk of invasive plant spread from the federal lands to adjoining non-federal lands and *vice versa* needs to be reduced. Invasive plant seeds are spread by the wind, water, animal and avian vectors, and human activities. Additional human disturbance and traffic would increase the potential for spreading invasive plants, but regardless of human activity, spread of these weeds would continue through natural forces. Thus, the Bitterroot National Forest cannot stop the spread of invasive plants to and from non-federal lands; it could only reduce the risk or rate of spread and control of known populations.

3.10.3.2 Alternative 1 – No Action

Direct Effects

Alternative 1 would not directly affect the introduction, spread, or establishment of invasive plants in the Como Forest Health project area. .

Indirect Effects

Under the No Action Alternative, invasive plants would continue to spread at a low to moderate rate as natural disturbances, such as insects, disease, wind throw, and fire, create openings and areas of soil disturbance. Wind or wildlife, livestock, humans, or off-road vehicles travel would continue to spread invasive plants by transporting invasive plant seed into open areas (Zouhar 2001a). It's more likely that invasive plants will spread into canopy openings created in areas that are adjacent to invasive plants-infested sites. Spotted knapweed, in particular, has an affinity for open areas on dry aspects and can invade these openings without soil disturbance as long as a seed source is available nearby (Zouhar 2001a).

Cumulative Effects

Since there would be no direct or indirect effects from Forest Service actions that could contribute to invasive plants introduction or spread, there would be no cumulative effects from this project. Ongoing actions such as annual road maintenance would still have the potential to affect invasive plants. All infestations within the project area are eligible for treatment under the 2003 Bitterroot National Forest Noxious Weed Treatment Project Environmental Impact Statement and Record of Decision. There are many areas of disturbed soils (roads, trails) and open bare ground across the Bitterroot National Forest, which can provide habitat for invasive plants. Lake Como is a highly used recreation area, which increases the potential for invasive plants spread.

In the absence of fuel reduction treatments, the severity of wildland fire would increase in the project area. High severity fire would create large canopy openings and expose areas of bare ground; conditions favorable for the introduction and colonization of invasive plants. The areas with the higher risk of invasive plant spread following a wildland fire would be adjacent to roads, recreation trails, and ground disturbance created by suppression activities.

3.10.3.3 Summary of Effects

Because the No Action alternative proposes no ground disturbance, the risk of introduction, spread, establishment, and persistence of invasive plants in the project area would be low.

3.10.3.4 Effects Common in Alternatives 2, 3, and 4

Design Features and Mitigation Measures

Design features and mitigation measures incorporated in the alternatives are listed in Table 2.2-5.

Direct Effects and Indirect Effects of Alternatives 2, 3, and 4

Soil disturbance indirectly affects invasive plant establishment s by providing suitable habitat. Drifting seed establishes easier on prepared soil than on intact soil. Currently there are 93 acres of detrimental soil disturbance in the project area units. National Forest system roads are not included in the soil analysis since they are removed from the productive land base. The detrimental soil disturbance estimate does not account for all soil disturbances. In regard to invasive plants, all soil disturbances, where vegetation is removed, creates a suitable substrate for seed germination. However, if small areas of soil disturbance are surrounded by native vegetation, the native vegetation is likely to revegetate the area. We assume in this analysis there will be soil disturbance that does

not meet the definition of detrimental soil disturbance in the treatment units. However, detrimental soil disturbance can be used as a relative comparison between alternatives. Since it is infeasible to measure all soil disturbances for each unit and associated activities, it is assumed that the proposed activities have an associated amount of general soil disturbance along with the detrimental soil disturbance measures, which allows for the comparison of relative disturbance between alternatives.

To eliminate the leafy spurge population in Unit 14 from the Forest, the population will be treated before and after project implementation. The treatment area will be monitored up to 10 years or more (Gucker, Corey L. 2010). Leafy spurge can sprout from remaining roots after the above ground plant has been eliminated. Monitoring is needed to determine if the treatment was successful and if follow-up treatments and management methods needs to continue.

Commercial Units

Opening the canopy creates more suitable habitat for invasive plants that occur in the Como Forest Health project area and methods to remove the canopy contribute to the spread of invasive plants. The infested units (Table 3.10- 4) have a high risk of spread when heavy equipment moves through them, disturbing the soil and removing canopy cover. Uninfested units with infestations within one-quarter mile of their unit boundary have a high risk of invasive plant introduction, most likely by equipment or machinery transporting seed from another unit or nearby infestations along the road. Tractor yarding over bare ground can displace up to 15% of the soil within a unit, therefore it is expected that 15% or less of the unit would become infested with invasive plant species and increases the likelihood of transporting invasive plant seed into new areas with harvest equipment. Skid trails will be evaluated post-harvest to determine the need for seeding. If the skid trails have been utilized so many times that there is no vegetation remaining on the trails, seeding will be needed to introduce vegetation for these highly disturbed on the ground areas. If the spread of invasive plants is minimized and soil or vegetation displacement is kept to a minimum, the risk of invasive plant introduction or spread will be reduced. Pulling slash back onto disturbed areas and seeding with native plant seed will minimize colonization by invasive plants. The slash creates microsites that favor native plant revegetation to out-compete invasive plants establishment. Seeding would also occur under all action alternatives as well using an approved noxious weed-free native plant mix approved by the Forest Botanist. Seeding with commercial seed mixes increases the risk of introducing invasive plants, or other unwanted seed, therefore all seed mixes must be certified weed -free and approved by the Forest Botanist.

Design features of the alternatives would minimize impacts that invasive plants would have from any action that may occur from this project. Given unpredictable vectors for invasive plants spread, such as vehicle usage by private parties, wildlife, water, and wind currents, it is not possible to quantify with any degree of confidence the rate of weed spread in the future, or even the degree by which that potential would be increased by the proposed actions. However, the proposed action, inclusive of design features, would minimize the spread of invasive plants, and eradication/control treatments would reduce existing invasive plants populations from spreading, but would not eliminate all impacts from the project. The Como Forest Health project is designed to minimize vegetation and soil displacement, which would minimize invasive plant introduction and colonization. Design features such as, vehicle washing (logging equipment), re-seeding, and other

invasive preventive techniques, would minimize the spread of invasive plants, reduce their current populations, and prevent the establishment of new populations (see design features above). Monitoring would identify new invasive plant populations and they would be scheduled for treatment or eradication. Pre-implementation and post-implementation treatments of current and new invasive plant populations will occur within the project area.

Non-Commercial Units

Although thinning would not open the canopy cover very much, there would be some opening and there would be much more opening occurring in plantations. Prescribed fire would increase the amount of light getting to the forest floor. The short-term effect of thinning would be that more light reaches the forest floor allowing the introduction (via wind, animals, etc.) and establishment (available suitable habitat) of sun-loving invasive plants. Eventually, as the overstory in a unit recovers following thinning invasive plants requiring more open conditions may not survive, and the increased risk of introduction and establishment would be a short-term impact. However, the longer the overstory remains open, as it would after commercial and non-commercial treatments, the longer the habitat remains suitable for sun-loving species and the longer the risk of establishment and persistence exists.

Retention of the overstory canopy in the non-commercial thin units would limit the risk of sun-loving, invasive plant colonization and establishment. Invasive plants that are more shade-or edge-tolerant, such as oxeye daisy and tall buttercup, may be able to colonize these treatment units. However, oxeye daisy and tall buttercup were not found in any of the non-commercial thin units. These invasive plants were found in units adjacent to unit 43.Unit 43 is a dry, south-facing slope and these invasive plants require sub-irrigated or moist habitats. Therefore, it is unlikely that they will colonize unit 43.

There is little risk that invasive plants would be spread by non-commercial thinning because there is little soil disturbance associated with this activity.

Leafy spurge is found in unit 14, a non-commercial thin unit. The population would be buffered from thinning and burning activities to avoid inadvertent seed transport and disturbance of the population. Herbicide treatments of leafy spurge were initiated in this unit when the population was found and will continue until the population is eradicated.

Prescribed Fire Units

The risk of weed spread intensifies in tractor units with the reintroduction of fire. This risk is greatest with burn piles or in areas with high fuel concentrations that burn intensely and destroy the mineral soil layer. Summer tractor yarding causes some soil disturbance so the added disturbance from fire may be enough to cause increases in invasive plants, particularly if burning is done in areas where ground disturbance has occurred or conditions are very dry (i.e. south or west-facing slopes). Burn piles will be scattered throughout the units and will not be seeded with native seed, but will be left to revegetate naturally over time. Burning piles would reduce native vegetation competition in those areas and expose mineral soil to create suitable conditions for invasive plants. Burn piles often have high incidence of invasive plants infestations due to initially removing native vegetation and the slow response of native plants to re-colonize. Although severe burning sterilizes the soil of most of its nutrients, native vegetation seems to colonize “red soil” (severely burned soil) as well as it colonizes unburned soil

(Hebel, et al. 2009). However, while invasive plants establishment is greatly reduced in nutrient-poor areas compared to greater nutrient sources, they still out-compete native vegetation, and establish and persist for long periods of time. Chipping, lopping, and scattering fuel material across the unit would carry less risk for the establishment and persistence of invasives than burning slash piles. Although, if there is too much scattered fuel, there is a higher risk for high severity wildfire events in which chipping, lopping, and scattering would not be preferable. Most landings will be placed in areas that have already been disturbed and will be re-seeded and fertilized, using native seed approved by the Forest Botanist, to help recover these areas faster and to try to eliminate those areas being established by invasive plants.

Roads

Vehicles are a primary method for transporting invasive plants because of the bare soil and soil displacement associated with roads. Invasive plant seed attaches to vehicles and is deposited along the vehicle's route. Road maintenance, temporary road construction, trails, and landing construction present a potential risk for seed dispersal of invasive plants from outside the project area as well as the spread of existing seed within the project area. There is a high risk of moving seed and introducing invasive plants from infested roads to proposed temporary and permanent roads. The existing roadside infestations would likely spread onto new road templates. The main vector for introduction in the action alternatives would be vehicle use and the movement of equipment from site to site. The timber sale contract specifies that all off-road equipment would be cleaned before entering Forest Service lands to prevent new invasive plants from entering the forest. The contract does not specify that equipment needs to be cleaned when moving from site to site on the forest. The timber sale contract does specify the use of designated skid trails, which minimizes the risk of spread across units. Opening closed roads to project activities would increase the amount of travel through infestations, the potential of spreading invasive plant seed along the travel route.

Alternative 2 and 4 propose building 2.08 and 1.14 miles of temporary road, respectively. Temporary roads would be closed to motorized access after project implementation yet the soil disturbance and increase in light availability would increase the risk of invasive plant colonization and establishment. This activity would create new ground disturbance for potential establishment of invasive plants, as well as disturb existing infestations of invasive plants. Seeding, where necessary, would minimize the risk of establishment of invasive plants. Pulling slash back onto disturbed areas and seeding will minimize the establishment of invasive plants. The slash will also create microsites that favor establishment of native plants and out-compete invasive plant colonization. Seeding would occur under all action alternatives as well using an approved noxious weed free native plant mix approved by the Forest Botanist. Seeding with commercial seed mixes increases the risk of introducing invasive plants, or other unwanted seed on site, therefore all seed mixes must be certified weed-seed free and approved by the Forest Botanist. However, temporary roads would be re-contoured to the natural landscape to facilitate natural hydrologic processes. Soil compaction and native vegetation disturbance would still occur in the initial construction, despite any reclamation. Over the long-term, the temporary roads would most likely have a mix of the seeded re-vegetation species, new colonizers from the surrounding vegetation, and invasive plants.

Cumulative Effects

Past, present, and reasonably foreseeable actions on National Forest in the project area that have affected or would affect invasive plants include timber harvesting, wildland fires and fire suppression, road construction, road maintenance and closures, recreation (fishing, hunting, snowmobiling, etc.), forest products gathering, invasive plants control, gravel sources, and special use permits. Past management activities and activities on private land have increased the invasive plant populations in the Como FHP project area.

The earliest activities considered in this analysis occurred in the late 1800s (excluding wildland fires) and, until recently, past activities incorporated few or no actions to prevent the introduction and spread of invasive plants. In general, past, present, and reasonably foreseeable activities with the greatest amount of ground disturbance, accompanied by a vector source of invasive plant seeds, had and have the greatest risk of invasive plant introduction, spread, establishment, and persistence. However, continued fuel build-ups from fire suppression will leave some areas in the Como Forest Health project area at a very high risk should a wildfire and continued increase in bark beetle infestation occur. A high severity fire creates conditions conducive to the spread of invasive plants. The association of wildfire and spread of invasive plants was demonstrated following the fires in 2000. Lake Como is a highly used recreation area, which increases the potential for invasive plants spread. Due to current high recreation use and the likelihood that the use will continue at the current rate or increase, the potential is high for new future invasive plants populations.

Invasive plants impact plant communities, especially in wetlands, riparian areas, and along roadsides in the project area. Foreseeable activities in the project area are expected to be similar to past and current activities: motor vehicle traffic, recreations use, and road maintenance. These activities would cause new site disturbance s that would be available for invasive plant colonization by existing s populations or new invasive plant species. The Forest Service is working to increase communication and treatment opportunities with other landowners, agencies, and organizations through the cooperation with the Ravalli County Weed Board. These coordinated programs increase the treatment effectiveness and results in a cumulative decrease in the spread of invasive plants. Through multiple agency and private landowner cooperation, many invasive plant populations, have been located and treated on federal and adjacent non-federal lands. This communication has also increased the educational outreach to land owners about the importance in treating and managing invasive plants, hopefully reducing the overall spread of invasive plants throughout the watershed.

The activities proposed in the Como Forest Health project area may contribute to the spread of invasive plants along roadsides and other open or disturbed areas. Controlling the spread of invasive plants into the Como Forest Health project area will continue with annual or periodic herbicide treatments of roads and areas around the campgrounds as decided in the 2003 Noxious Weed Treatment Project Record of Decision invasive plants (USDA Forest Service 2003a).

3.10.3.5 Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

All alternatives would be consistent with Forest Plan goals to “control invasive plants, to protect resource values, and minimize adverse effects on adjacent private land”. Design features are specified in the document to be followed through in implementation. Design

features and timber contract specifications require all machinery to be cleaned prior to entering the project area. All ground-disturbing activities are required to follow certain invasive plants prevention methods as outlined in the Noxious Weed supplement to FSM 2080 (PF#K-Weeds1).

Bitterroot National Forest Plan (USDA FS 1987)

The primary means of preventing, containing, or controlling noxious weeds will be through vegetative management practices. In this project, all of the alternatives would be consistent with the Forest Plan.

National Forest Management Act of 1976

The project design criteria in the Como Forest Health project that prescribe control and monitoring actions for invasive plants/noxious weeds will protect the ecological health and diversity of native plant and animal communities.

Federal Noxious Weed Act of 1974 as amended in 1990

This Act applies directly to the Como FHP by promoting the development and implementation of the terms of the current Participating Agreement with Ravalli County to control noxious weeds/invasive plants on the National Forest in the project area and to prevent their spread onto private lands that lie immediately to the east of the project area.

Bitterroot National Forest Noxious Weed Treatment Project Environmental Impact Statement and Record of Decision, March 2003

Design criteria for invasives work in the Como Forest Health Project will follow the guidelines provided in the 2003 EIS.